

Magnetic Resonance Imaging as a Screening Tool for Prostate Cancer

Akademisk avhandling

Som för avläggande av medicine doktorsexamen vid Sahlgrenska akademien, Göteborgs universitet kommer att offentligen försvaras i Hjärtats Aula, Blå Stråket 5, Sahlgrenska Universitetssjukhuset, onsdagen den 12 maj, klockan 09.00

av **Kimia Kohestani**

Fakultetsopponent:

Docent **Lars Henningsohn**

Institutionen för klinisk vetenskap, Intervention och teknik (CLINTEC),
Karolinska institutet, Stockholm

Avhandlingen baseras på följande delarbeten:

- I. **Kohestani K**, Wallström J, Dehlfors N, Sponga OM, Månsson M, Josefsson A, Carlsson S, Hellström M, Hugosson J. **Performance and inter-observer variability of prostate MRI (PI-RADS version 2) outside high-volume centres.** *Scand J Urol.* 2019; 53(5): 304-311.
- II. **Kohestani K**, Månsson M, Arnsrud Godtman R, Stranne J, Wallström J, Carlsson S, Hellström M, Hugosson J. **The GÖTEBORG Prostate Cancer Screening 2 Trial: a prospective, randomised, population-based prostate cancer screening trial with prostate-specific antigen testing followed by magnetic resonance imaging of the prostate.** *Scand J Urol.* 2021; 22: 1-9.
- III. **Kohestani K**, Arnsrud Godtman R, Axcrona U, Egevad L, Hellström M, Khatami A, Pihl CG, Stranne J, Wallström J, Månsson M, Carlsson S, Hugosson J. **The value of systematic biopsies in screening for prostate cancer with PSA followed by MRI – Results from The GÖTEBORG Prostate Cancer Screening 2 Trial** (*in manuscript*).
- IV. **Kohestani K**, Langkilde F, Carlsson S, Geterud K, Arnsrud Godtman R, Pihl CG, Wallström J, Hellström M, Månsson M, Hugosson J. **Added value of prostate MRI in predicting significant prostate cancer at prostatectomy** (*submitted manuscript*).

SAHLGRENSKA AKADEMIN
INSTITUTIONEN FÖR KLINISKA VETENSKAPER



Magnetic Resonance Imaging as a Screening Tool for Prostate Cancer

Kimia Kohestani

Department of Urology, Institute of Clinical Sciences
Sahlgrenska Academy, University of Gothenburg
Gothenburg, Sweden

ABSTRACT

The overall aim of this thesis was to explore the role of Magnetic resonance imaging (MRI) of the prostate as an adjunct to the prostate-specific antigen (PSA)-test in screening for prostate cancer (PCa), focusing on the performance of MRI in detecting clinically significant PCa within the randomised controlled GÖTEBORG Prostate Cancer Screening 2 Trial. By inviting men 50–60 years of age to different screening strategies—PSA cut-off for biopsy 3.0 ng/mL versus 1.8 ng/mL and MRI followed by systematic +/- targeted biopsies—this ongoing trial evaluates whether PSA-testing followed by MRI and targeted biopsies can reduce overdiagnosis, while maintaining the detection of clinically significant PCa, as compared to PSA and systematic biopsies.

Paper I evaluates the performance of prostate MRI outside high-volume centres. A moderate PCa detection rate and large variability between readers were found, underlining the importance of continuing quality assurance initiatives where each local MRI unit records and evaluates its own detection rate, as well as robust training programs for radiologists. **Paper II** describes the study design and assesses the participation rates in the Göteborg-2 trial. Acceptable participation rates were found for PSA, MRI and biopsy. **Paper III** evaluates the value of systematic biopsies in sequential screening for PCa with PSA followed by MRI. With experienced radiologists reporting MRI, omitting systematic biopsies can be feasible in a program with repeat screening and could reduce unnecessary biopsies. **Paper IV** evaluates the role of pre-biopsy prostate MRI in risk stratification for men with newly diagnosed PCa and was found to be of added value. How information from MRI is best utilized in clinical practice remains to be clarified.

In summary, PSA-testing and prostate MRI are the cornerstones in screening and early detection of PCa. Further research in the coming years will shed light on how to customize optimal screening strategies.

Keywords: early detection, magnetic resonance imaging, prostate-specific antigen, prostate cancer, screening